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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/662,503	09/15/2003	Michael J. Roche	80107.079US1	9215

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EXAMINER
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ALEJANDRO, RAYMOND

ART UNIT	PAPER NUMBER
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1745

DATE MAILED: 04/07/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/662,503

Applicant(s)

ROCKE ET AL.

Examiner

Raymond Alejandro

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 16 March 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-33 is/are pending in the application.
- 4a) Of the above claim(s) 1-14 and 25-33 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 15-24 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 09/15/03 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### *Election/Restrictions*

1. Applicant's election without traverse of Group I and Species 2 (claims 15-24) in the reply filed on 03/16/06 is acknowledged.

### *Drawings*

2. The drawings were received on 09/15/03. These drawings are acceptable.

### *Specification*

3. The abstract of the disclosure is objected to because it is not sufficiently descriptive of the technical matter being disclosed. Correction is required. See MPEP § 608.01(b).
4. Applicant is reminded of the proper language and format for an abstract of the disclosure.

The abstract should be in narrative form and generally limited to a single paragraph on a separate sheet within the range of 50 to 150 words. It is important that the abstract not exceed 150 words in length since the space provided for the abstract on the computer tape used by the printer is limited. The form and legal phraseology often used in patent claims, such as "means" and "said," should be avoided. The abstract should describe the disclosure sufficiently to assist readers in deciding whether there is a need for consulting the full patent text for details.

The language should be clear and concise and should not repeat information given in the title. It should avoid using phrases which can be implied, such as, "The disclosure concerns," "The disclosure defined by this invention," "The disclosure describes," etc.

### *Double Patenting*

5. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined

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application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

6. Claims 15-24 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-4, 8-11 and 13-19 of copending

Application No. 10/662561 (*US Patent Application Publication 2005/0058867*). Although the conflicting claims are not identical, they are not patentably distinct from each other because:

The copending application's 561 claims the following (CLAIMS 1-4, 8-11 and 13-19):

1. An apparatus comprising:
  - a fuel cell;
  - an integrated circuit; and
  - a cooling system to cool the fuel cell and the integrated circuit;wherein the cooling system includes a fluid medium to remove heat from the fuel cell and the integrated circuit.
2. The apparatus of claim 1 wherein the fuel cell includes at least one electrode through which the fluid medium passes.
3. The apparatus of claim 1 further comprising a pump to pump the fluid medium.
4. The apparatus of claim 1 further comprising at least one temperature sensor.

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8. The apparatus of claim 4 further comprising a control system adapted to modify a power output level of the fuel cell in response to a temperature sensed by the temperature sensor.

9. The apparatus of claim 1 wherein the integrated circuit comprises a processor.

11. The apparatus of claim 1 wherein the fluid medium comprises a liquid metal.

13. An apparatus comprising:

a fuel cell having an electrode with passageways through which a fluid cooling medium can pass; and

a fluid path adapted to be coupled to the passageways and to a heat generating device other than the fuel cell.

14. The apparatus of claim 13 further comprising a pump coupled to the electrode, the pump configured to pump the fluid cooling medium through the passageways.

15. The apparatus of claim 13 further comprising an integrated circuit coupled to the fluid path.

16. The apparatus of claim 15 wherein the integrated circuit comprises a graphics circuit.

17. The apparatus of claim 15 wherein the integrated circuit comprises a processor.

18. The apparatus of claim 13 further comprising a temperature sensor.

19. The apparatus of claim 18 further comprising a control system to increase the fuel cell output when a temperature sensed by the temperature sensor drops.

*In this case, the claims of the copending application '561 fully encompass the subject matter of the present invention. Additionally, combinations of one claim of the copending application '561 with another claim thereof represent obvious variations of the present invention.*

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

***Claim Rejections - 35 USC § 102***

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

8. Claims 15-16 and 23-24 are rejected under 35 U.S.C. 102(b) as being anticipated by Stedman et al 3704172.

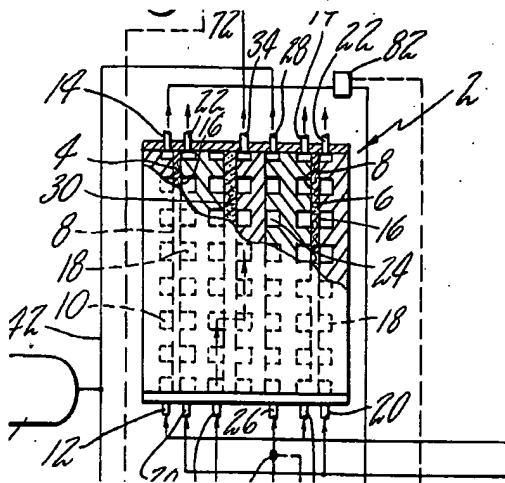
The present claims are directed to an apparatus wherein the disclosed inventive concept comprises the specific electrode with the fluid passage.

As to claim 15:

Stedman et al disclose a dual mode fuel cell system (TITLE) including a fuel cell 6, anodes 8 and cathodes 16 (COL 2, lines 35-37). Enlarged portion of **Figure 1** below illustrates these features.

Stedman et al disclose that the fuel cell includes coolant liquid passage 24 having an inlet 26 and an outlet 28 for closed cycle mode operation cooling of the fuel cell power section; and evaporative cooling means 30 having a liquid inlet 32 and a vapor outlet 34 for open cycle mode operation cooling thereof (COL 2, lines 67-72).

As evident from the Figure below, coolant liquid passage 24 and evaporative cooling means 30 are disposed in the opposite side of reactive channels. Thus, the electrodes have fluid passages through which a fluid cooling medium can pass.



Stedman et al disclose heat exchange means 46 which may be a radiator (COL 3, lines 10-15); and condenser 56 (COL 3, lines 23-27); and evaporative cooling means (COL 2, lines 70-72). In addition to that, of particular interest is the teaching that Stedman et al encompass closed cycle operation cooling (COL 3, lines 3-19/ CLAIM 1); open cycle operation cooling (COL 3, lines 43-64/ CLAIM 1); close cycle electrolyte diluent removal including the use of a coolant (COL 3, lines 20-42/ CLAIM 1); and open cycle operation electrolyte diluent (COL 3, line 65 to COL 4, line 10/ CLAIM 1). *Hence, the cycle electrolyte loop of Stedman et al also is a cooling medium loop. Thus, it is contended that all of the features above, collectively or in combination, represent the heat generating device.*

As to claim 16:

Stedman et al use pumps 44 and 58 (COL 3, lines 10-13 & COL 3, lines 25-27/ CLAIM 2).

As to claim 23:

Stedman et al use temperature sensing means 40 and temperature sensor 41 (COL 3, lines 8-10 & COL 3, lines 34-36/CLAIM 2).

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As to claim 24:

Stedman et al is concerned with controlling the output of the fuel cell in response to a sensed temperature (COL 3, lines 15-19/ COL 3, lines 39-43).

Thus, the present claims are anticipated.

***Claim Rejections - 35 USC § 103***

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

10. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

11. Claims 17-20 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stedman et al 3704172 as applied to claim 15 above, and further in view of Wang et al 2003/0170515.

Stedman et al is applied, argued and incorporated herein for the reasons above.



Stedman et al disclose that the fuel cell includes coolant liquid passage 24 having an inlet 26 and an outlet 28 for closed cycle mode operation cooling of the fuel cell power section; and evaporative cooling means 30 having a liquid inlet 32 and a vapor outlet 34 for open cycle mode operation cooling thereof (COL 2, lines 67-72). As evident from the Figure below, coolant liquid passage 24 and evaporative cooling means 30 are disposed in the opposite side of reactive channels. Thus, the electrodes have fluid passages through which a fluid cooling medium can pass.

However, the preceding prior art reference fails to expressly disclose the heat generating device being an integrated circuit.

Wang et al disclose fuel cell system having integrated electronic devices (TITLE) including heat generating electronic devices (ABSTRACT) such as semiconductor integrated circuits including one or more central processor units (CPU), digital signal process (DSP), routers, data storage devices and power amplifiers (CLAIMS 18 & 4); and wireless communication devices (CLAIM 19).

In view of the above, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to use the heat generating device being an integrated circuit of Wang et al in the fuel cell system of Stedman et al because Wang et al disclose that the heat generated by the electronic device provides the temperature necessary for fuel processor to convert fuels (P. 0007); thus, the energy required for heating the fuel processor is therefore reduced (P. 0008). Therefore, the energy efficiency is therefore increased (P. 0010). Additionally, the use of Wang et al's heat generating electronic device allows to integrate fuel

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cell components with electronic devices in a miniature scale (P. 0009). Thus, it represents a reduction in size.

12. Claims 17, 20 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stedman et al 3704172 as applied to claim 15 above, and further in view of Jankowski et al 2004/0048128.

Stedman et al is applied, argued and incorporated herein for the reasons above.

Stedman et al disclose that the fuel cell includes coolant liquid passage 24 having an inlet 26 and an outlet 28 for closed cycle mode operation cooling of the fuel cell power section; and evaporative cooling means 30 having a liquid inlet 32 and a vapor outlet 34 for open cycle mode operation cooling thereof (COL 2, lines 67-72). As evident from the Figure below, coolant liquid passage 24 and evaporative cooling means 30 are disposed in the opposite side of reactive channels. Thus, the electrodes have fluid passages through which a fluid cooling medium can pass.

However, the preceding prior art reference fails to expressly disclose the heat generating device being an integrated circuit.

Jankowski et al teach fuel cells (TITLE/ABSTRACT). Jankowski et al further discuss that integrated circuit type microfabrication processes are used to pattern the electrode contacts, as well as to form a resistive heater element within the fuel cell stack structure (P. 0031).

In view of the above, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to use the heat generating device being an integrated circuit of Jankowski et al in the fuel cell system of Stedman et al because Jankowski et al discuss that

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integrated circuit type microfabrication processes are used to pattern the electrode contacts, as well as to form a resistive heater element within the fuel cell stack structure. Thus, Jankowski et al readily envision the use of integrated circuit as resistive heater elements within fuel cell stack structure. As is well known in the art, the use of integrated circuit elements allow to reduce the size of devices or apparatus using the same.

13. Claim 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over: a) Stedman et al 3704172 in view of Wang et al 2003/0170515; and/or b) Stedman et al 3704172 in view of Jankowski et al 2004/0048128 as applied to claim 20 above, and further in view of Skala 3911288.

Stedman et al, Wang et al and Jankowski et al are applied, argued and incorporated herein for the reasons above. However, none of the preceding references expressly disclose the specific cooling medium comprising the liquid metal.

Skala discloses that alkali metals have been used as a source of energy in heat engines and fuel cell (COL 1, lines 50-57). Disclosed is the use of NaK as a fuel in an oxidative reaction in a fuel cell (Col 2, lines 39-45/CLAIM 14/ COL 4, lines 22-25). It is disclosed that liquid metal NaK releases large amounts of energy when this alloy is reacted with oxidizers (COL 3, lines 20-23); and that direct cooling of the liquid metal is an advantage (COL 3, lines 44-47).

With these teachings, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to employ the specific cooling medium comprising the liquid metal of Skala in the fuel cell system of Stedman et al-Wang et al and/or Stedman et al-Jankowski because Skala discusses that direct cooling of the liquid metal is an advantage over

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conventional cooling mediums as well as that such liquid metal is capable of releasing large amounts of energy. Thus, liquid metals are suitable cooling medium fluids.


***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Raymond Alejandro whose telephone number is (571) 272-1282. The examiner can normally be reached on Monday-Thursday (8:00 am - 6:30 pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick J. Ryan can be reached on (571) 272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Raymond Alejandro  
Primary Examiner  
Art Unit 1745



RAYMOND ALEJANDRO  
PRIMARY EXAMINER